

# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 10-114007

(43)Date of publication of application : 06.05.1998

(51)Int.Cl.

B32B 7/02

B32B 7/02

B32B 17/06

(21)Application number : 09-225163

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(22)Date of filing : 21.08.1997

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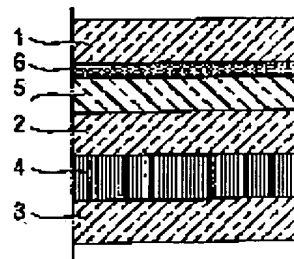
Priority number : 96 9610344    Priority date : 22.08.1996    Priority country : FR

## (54) GLAZING WITH VARIABLE OPTICAL AND/OR ENERGETIC PROPERTIES

(57)Abstract:

**PROBLEM TO BE SOLVED:** To enable defects to be overcome by glazing which indicates high heat resistance or in which its optical appearance can be adjusted more highly by taking the form coating of one layer having reflectivity in an infrared area and a visible area or an ultraviolet area.

**SOLUTION:** Glass 1/reflective coating/linkable polymer sheet/glass 2/electrochromic system/glass. The reflective coating, separately, is arranged on the surface of the glass 2 facing the sheet of the linkable polymer sheet, or if it has enough mechanical and chemical durability, can be arranged on the outside surface of the glass 1. The laminated structure, for example, has the order of glass 1/reflective coating/linkable polymer sheet/glass 2/ electrochromic system/glass 3/glass intermediate layer/glass 4 and can be mounted as insulating double glazing.



## LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]



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## CLAIMS

[Claim(s)]

[Claim 1] They are a type (4) of the adjustable light transmission nature / absorptivity system especially controllable on an electric target which has adjustable optics and/or energetics, a type of an adjustable light diffusion system, or the type of a photochromic system. It is the grading containing at least one activity system (4; 16). At least one means for accommodation of optical appearance given to said grading by heat protection for said activity system and/or said system is included. Grading characterized by said means being the gestalt of coating (6; 17) of at least one layer which has reflexivity in an infrared field, a visible-rays field, and/or an ultraviolet-rays field.

[Claim 2] Grading according to claim 1 characterized by including at least one layer of reflexivity layers which said coating (6; 17) is used combining it with at least one-layer layer of a dielectric material, and are especially arranged between layers of a two-layer dielectric material.

[Claim 3] Grading according to claim 1 or 2 characterized by said coating (6; 17) containing a reflexivity layer which uses at least one sort of metals of a group of Ag, Au, Cu, aluminum, Cr, nickel, Fe, Ta, Zn, Zr, Sn, In, Rh, and Cd as the base, or at least one layer of reflexivity layers which carry out the base of at least one sort of metal nitrides like TiN, ZrN, or HfN.

[Claim 4] Grading according to claim 1 characterized by including a reflexivity layer to which said coating (6; 17) uses as the base a metallic oxide which may be doped, and at least one layer of reflexivity layers which use titanium oxide or doped titanium oxide as the base especially.

[Claim 5] A system controllable on said electric target is a conductive layer, H<sup>+</sup>, Li<sup>+</sup>, and Na<sup>+</sup>. And Ag<sup>+</sup> By the so-called cathode electrochromic layer which can pour in a cation [ like ] reversibly, electrolyte layer, and request The second electrochromic layer of an anode which can pour in a cation reversibly (the second electrochromic layer of an anode does not need to be contained even if contained), And grading of claims 1-4 given in any 1 term characterized by being the adjustable light transmission nature / light absorption nature system of a gestalt of a system containing a reversible impregnation nature material like an electrochromic system containing a stack of a functional layer containing the second conductive layer (4).

[Claim 6] Grading according to claim 5 characterized by including a stack of a functional layer in which said electrochromic system (4) contains an electrolyte material which is the gestalt of a gestalt of aquosity or an anhydrous nature liquid, polymer, or gel.

[Claim 7] It is the grading according to claim 5 to which said electrochromic system (4) is characterized by said electrochromic system being desirable and including only a layer of a solid material including a layer of an electrolyte of a gestalt of a solid material, especially a gestalt of a metallic oxide.

[Claim 8] Grading of claims 1-7 given in any 1 term characterized by being an electrochromic system (4) containing a stack of said functionality layer by which a controllable system is electrically arranged between transparent rigid carrier base materials (2 3) of two sheets.

[Claim 9] Grading of claim 1-7 given in any 1 term characterized by being an electrochromic system containing a stack of said functional layer by which a controllable system has been arranged on a single transparence rigidity carrier base material electrically.

[Claim 10] Grading according to claim 8 or 9 characterized by carrying out the laminating at least of one side of a carrier base material (2 3) of an electrochromic system (4) to another rigid base material (1) through an interlayer who is the sheet of PVB, EVA, or PU type affinity polymer.

[Claim 11] Grading of claims 8-10 given in any 1 term which uses at least one side of a carrier base material (2 3) of said electrochromic system (4) combining other at least one rigid base material through an interlayer who is a gas interlayer (5), and is characterized by forming multiplex grading.

[Claim 12] Said reflexivity coating (6; 17) is arranged on a field of one of carrier base materials, and said field is located in a field and the opposite side facing an electrochromic system side. Or it is arranged on one field of one of other base materials which constitutes grading. [ whether it has sequence of sheet (5) / glass (2) / electrochromic system (4) / glass of glass (1) / reflexivity coating (6) / affinity polymer (3) especially, and ] Or grading of claim 8-11 given in any 1 term characterized by being attached to a conductive layer of said system.

[Claim 13] Electrically, a controllable system is an adjustable light diffusibility system of a gestalt of an optical bulb or a liquid crystal system (16), a complex film of polymer with which drop let of liquid crystal is embed especially is include, and it is an ordinary index no preferably. A refractive index  $n_p$  of polymer Grading of claim 1-4 given in any 1 term characterize by be equally arrange between two-layer and conductive layers.

[Claim 14] An optical bulb between two-layer conductive layers (16) or a liquid crystal type complex film is grading according to claim 13 characterized by the thing [ having glass, acrylic polymer, a transparent rigid or semi-rigid carrier base material of a type of a specific polycarbonate PC, or a carrier base material (14; 15) of flexible polyethylene terephthalate PET type flexibility especially on one side in each of the field ] at least.

[Claim 15] In a unit containing an optical bulb or a liquid crystal type complex film (16) A conductive layer and its carrier base material (14; 15) A polyvinyl butyral (PVB), By assistance of at least one layer of ethylene-vinyl acetate (EVA) or organic affinity polymer (12 13) of a type of specific polyurethane (PU) Grading according to claim 14 characterized by carrying out the laminating to a transparent rigid glass type base material (10 11) of at least one layer.

[Claim 16] Grading of claims 13-15 given in any 1 term characterized by drop let of liquid crystal of complex (16) containing with a gestalt of two-color coloring matter especially including coloring matter.

[Claim 17] Reflexibility coating (17) is arranged on one field of one of the carrier base materials (11). It is on one field of one which constitutes grading of other base materials. especially -- grading -- glass -- (-- ten --) -- /- - reflexibility -- coating -- (-- 17 --) -- /-- affinity -- polymer -- a sheet -- (-- 12 --) -- /-- flexibility -- a sheet -- (-- 14 --) -- /-- complex -- (-- 16 --) -- /-- flexibility -- a sheet -- (-- 15 --) -- /-- affinity -- polymer -- a sheet -- (-- 13 --) -- /-- glass -- (-- ten --) -- Grading of claim 13-15 given in any 1 term.

[Claim 18] It is the grading of claims 13-17 given in any 1 term which is used through an interlayer of a carrier base material (10 11) of a liquid crystal system (16) whose either at least is a gas interlayer (19), combining with other at least one rigid base material, and is characterized by forming multiplex grading.

[Claim 19] It is the grading of claims 1-18 given in any 1 term which at least one of the base materials which are the component parts of said grading is an absorptivity base material, is the vitrified base material especially colored the whole, and is separated from a base material (11) which touches reflexibility coating (17) by activity system (4; 16) at least preferably.

[Claim 20] Use of grading of claim 1-19 as external grading, internal partition grading, or a door with gloss given [ as grading of a building ] in any 1 term.

[Claim 21] As grading for a means of transportation, it is use of grading according to claim 1 to 19 as grading for an automobile especially like a vehicle roof, grading of a train, or grading of an aircraft.

[Claim 22] A mirror, grading of claims 1-18 as a mirror to which silver plating of the "spy" mirror type is not carried out especially given in any 1 term.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001] This invention relates to the grading which has adjustable optics/energetics, optical diffusibility or light transmission nature -- it can change -- or specific electromagnetism -- it is related with the grading which can be changed under the effect of a line. [ in / in the wavelength of the specification of an electromagnetic wave / some of properties of grading can change this invention into accuracy under the effect of electric supply more, for example, / especially / infrared radiation and/or visible rays ]

[0002] In order to take the so-called "intelligence" grading, i.e., especially various modification parameters, into consideration, the demand of the grading in which a property is adjusted at will and it deals is actually increasing increasingly. Thus, probably, it turns out that it is very advantageous that the incidence of sunlight is controllable through the grading with which the building, the motorised vehicle, or the train type vehicle was equipped externally, in order to avoid too much heating of the room or a compartment at the time of strong sunlight. It can be useful that the degree of the visibility which similarly let grading pass in the case of the grading used as internal party SHON between two compartments in the means of a means of transportation the internal partition between two rooms in a building, a train, or aircraft type is also controllable. : to which many of other uses exist in such grading -- here, the reflector glass for example, in a vehicle can be mentioned, and by [ which is necessity ] becoming by the way more dark, it can prevent \*\*\*\*\* of the eyes of the driver from the road or street indicator panel in which a chisel message or a design is shown intermittently, in order to attract attention to fitness more.

[0003] The interest which such grading can pull out serves as a reason of the fact that many of such systems have already been studied.

[0004] Thus, especially the known system that can adjust the light transmission nature or absorptivity of grading is the so-called viologen system which is indicated by U.S. Pat. No. 5,239,406 or Europe patent application EP-A-0 612826. It makes it possible to essentially acquire adjustable absorptivity in a visible range.

[0005] For the same purpose, the so-called electrochromic system also exists and the principle of the device is shown briefly. : These are reversible and a color from which the oxidation state corresponding to the condition or deimpregnation condition poured into coincidence including the layer of the electrochromic materials which can pour in a cation and an electron differs like known, and one side of the condition shows light transmission nature higher than another side. An impregnation reaction or a deimpregnation reaction is performed by assistance of a current generator or a voltage generator by suitable electric supply. Electrochromic materials usually use a tungstic-acid ghost as the base, and it contacts an electron source like the electronic conductivity layer of transparence, and a source of a cation like an ion conductivity electrolyte, and must be arranged.

[0006] Furthermore, it is about 100 at least. In order to secure switching of a time, it is known that the layer of electrochromic materials must be together put with the counter-electrode which can pour a cation into as symmetrical relation as the layer of electrochromic materials reversibly, and, thereby, it is considered macroscopically that an electrolyte is a simple medium for a cation.

[0007] When an electrochromic layer is in an attenuation condition, a color is middle, or it is transparent or must consist of a layer currently colored a little. Since tungstic oxide is cathode electrochromic materials (i.e., since a coloring condition is in the condition returned most), generally anode electrochromic materials like nickel oxide or oxidation iridium are used for a counter-electrode. Using the material which is neutrality optically in an oxidation state is also proposed, for example, they are a selenium dioxide or an electronic conductive polymer (poly aniline etc.). An organic material or Prussian blue is included. [ like ]

[0008] The publication of such a system will be looked at by Europe patent EP-0 338 876, EP-0 408 427, EP-0 575 207, and EP-0 628 849.

[0009] the type of the electrolyte which uses current and these systems -- 2 : which can be classified into the category of a seed - electrolyte -- the gestalt of polymer or gel -- For example, [ whether it is the proton conductive polymer which is indicated by Europe patent EP-0 253 713 and EP-0 670 346, and ] Or although it is the polymer of lithium ion conductivity which is indicated by EP-0 382 623, EP-0 518 754, and EP-0 532 408, or - or an electrolyte is an inorganic layer and it is ion conductivity It is electronic insulation and is the term in

which an "all solid" electrochromic system is used. Because of explanation of an "all solid" electrochromic system, it is application number FR-96/03799. 1996 year 3 The France patent application specification for which it applied to the moon 27 day can be referred to.

[0010] these systems containing a reversible impregnation material are advantageous at especially the point that absorption can be adjusted in the wavelength of a range larger than a viologen system : it is visible -- especially, in infrared rays, it can absorb in adjustable and things can perform not \*\* but presenting effective optics and/or a heat function by this.

[0011] The viologen or the electrochromic system combined with it or it adhered the transparence base material forms grading, and is that light absorption nature and permeability (it is energy permeability to a list). It can change in the given range and especially this range is decided by selection of the electrochromic materials used, and/or selection of that thickness.

[0012] "Intelligence" grading another type is called in a term called an optical bulb. : This is a film including the matrix of the polymer over which the bridge was generally constructed which the detailed drop let containing the particle which has the property located in a line in the desirable direction under an operation of electric field or a magnetic field is distributing.

[0013] Especially a film shows an adjustable optical property as the concentration of the particle in which the potential difference added to the terminal of the conductive layer arranged to both sides of a film and orientation are possible, and a function of the property.

[0014] Thus, patent WO-93/09460 The optical bulb which uses as the base the matrix manufactured from cross-linking polyorganosiloxane and the particle in which inorganic or organic orientation is possible, and the film which contains a light absorption nature particle, for example, a poly iodide particle, in details is indicated more. When voltage is applied to a film, as for a particle, only a few intercepts light all the time rather than the time of voltage not being applied.

[0015] The grading which operates by the same principle is also known by the basis of a term called liquid crystal grading. It is 2. Let the polymer material which the drop let of a liquid crystal and the nematic liquid crystal which has a positive dielectric anisotropy especially is distributing be the base based on using the film arranged between the conductive layers of a layer. When voltage is applied to a film, itself carries out orientation of the liquid crystal in accordance with a desirable shaft, and, thereby, it serves as visibility. If there is no voltage, there will be no alignment of liquid crystal, and a film will become diffusibility, and visibility will be controlled.

[0016] Especially the example of such a film is indicated by Europe patent EP-0 238 164 and U.S. Pat. No. 4,435,047, U.S. Pat. No. 4,806,922, and U.S. Pat. No. 4,732,456. 2 This type of film which the laminating was once carried out and was incorporated between the glass substrates of \*\* is sold by Saint-Gobain Vitrage by the trade name of "Priva-lite".

[0017] "NCAP" (a nematic curvilinear array phase (Nematic Curvilinearly Aligned Phases) or "PDLC" (all the liquid crystal devices known for a term called polymer distribution liquid crystal (Polymer Dispersed Liquid Crystal) can actually be used.))

[0018] International patent WO-92/19695 It is also possible to use the gel which uses little \*\*\*\* cholesteric liquid crystal as the base for the polymer which constructed the bridge as indicated.

[0019] the absorptivity in a visible region, and the energy with which a part of [ infrared / at least ] absorptivity is generally located in ultraviolet rays if it can do -- electromagnetism -- the so-called photochromic grading which can be adjusted under the effect of a line also exists. It is mainly these 2. There is a class of \*\*. : The first, as an active ingredient, silver salt, especially a silver halide are used for example, in a vitrified matrix, and a halogenide is reversibly converted into the gestalt of a metallic-bond object by the absorption in ultraviolet rays. It is the compound which the second class uses organic dye as an active ingredient, and it was generally distributed in the polymer matrix, and was especially guided from SUPIRO oxazine and a SUPIRO pyran. These compounds are reversibly isomerized by the absorption in an ultraviolet region.

[0020] However, all such grading shows them the limit of a proper, shows the limit especially applied to the thermal action by one side, and shows the limit applied to the optical appearance on the other hand.

[0021] Such grading can actually depend the endurance on two or more temperature attached including an activity component electrically and/or electrochemically. When it is in a coloring condition in the specification of the grading which has adjustable light transmission nature (for example, the case of electrochromic grading), it is very absorptivity to energy. When used as external grading for this reason, if it receives still more perpendicularly and is inclined and equipped, when [ long enough ] a time amount pan is carried out, it may be heated in the state of coloring by even the elevated temperature which amounts to 80 degrees C to still more (the case where it is the grading for automobile grading like an automobile roof or the roof of a building is applied) strong sunlight. Now, such an elevated temperature is 1 of the electrochemistry component of grading. The life of grading can be shortened by progressive irreversible deterioration of \*\* or others.

[0022] Also in the case of the grading which has adjustable optical diffusibility like liquid crystal grading, a

problem of the same kind may arise. The liquid crystal polymer complex which changed to the diffusion condition in the first place can return to a transparency condition spontaneously, if it exceeds a specific temperature called the clearing point. Next, if a two-color color is added to complex so that both the optical diffusibility and light transmission nature of grading can be adjusted, this type of color is a certain amount of instability in an ultraviolet region, and shows the instability which increases with temperature.

[0023] Photochromic grading has a defect about the heating again. Above 2 [ actually ] It is colored under the effect of an ultraviolet region and the photochromic grading of a seed returns to the "stable" condition which changed into "instability" condition and became thin according to the process by which heating activation is carried out. Such grading presents a color to the bottom of the effect of an ultraviolet region, and it becomes absorptivity, and, so, is heated. In the case of strong sunlight, heating becomes excessive too much, grading tends to return to the stable state which became thin, and the contrast "acquired" is reduced.

[0024] Furthermore, probably, the optical appearance of such grading is fully unsatisfying depending on the meant use. When the transverse plane of the whole building is equipped with electrochromic grading for this reason and those all are in a coloring condition, it is possible that the appearance of the whole which is the color which is written a little, and which ended is presented. Probably, it also turns out that it is advantageous to have the capacity that the reflective appearance of the electrochromic grading with which a vehicle is equipped by the color of an external body work can be adjusted more to fitness. Similarly, the grading which contains liquid crystal in a diffusion condition is the appearance (without a color exists) of the opalescence related [ to the side in which a watcher is ] and same. It presents. For this reason, it can be advantageous that the symmetric property of this appearance can be removed for the reason for esthetic.

[0025] The purpose of this invention is new grading which so has the property which can be optics and/or energetics especially the controlled adjustable electrical and electric equipment, or adjustable optical coloring nature, and is conquering these defects especially by proposing the grading in which higher thermal resistance is shown, and/or the optical appearance is adjusted more by altitude, and it deals.

[0026] The theme of this invention is electrically controllable especially adjustable light transmission/. At least 1 which has the adjustable optics and/or the energetics which are a thing an absorptivity system type, an adjustable diffusibility system type, or photochromic type It is the grading containing the activity system of a seed. This grading includes further electrically the means of protection against the heat for a controllable system, and/or the means of accommodation of optical appearance electrically given to grading by the controllable system. This means is at least 1 which has reflexivity in an infrared region, a visible region, and/or an ultraviolet region advantageously. It is the gestalt of coating of a layer.

[0027] By the configuration in grading, this reflexivity coating is actually 2 alternatively or in multiplex. The function of \*\* can be considered.

[0028] When equipped with grading, they are a heat source and activity (electrochemistry). When coating is arranged in grading so that it may come between systems, it acts as a heat screen and reflects all or a part of energy emitted by the heat source. For this reason, it prevents too much heating of an electrochemistry type activity system. A building or a vehicle is externally equipped with the most advantageous application, and it is related with the grading which is going to be exposed to long duration sunlight. It can be strongly heated by energy-absorbing under the nonexistence of heat "a filter" in the condition that it was colored about electrochromic grading especially at details, and heating has a bad influence in the life of grading, and the skin temperature of grading can amount to 80 degrees C without a heat filter also from the problem on safety.

[0029] It tends to lose the property as mentioned above also about photochromic type activity grading at the time of too much heating.

[0030] This is 2. It has the very advantageous result of \*\*.

- At one side, this invention can prolong the life of "intelligence" grading by which external application was already meant. This is very advantageous commercially and technically, and a builder is very advantageous to both the construction field which must guarantee the life for which a material is used, and the automobile field to which strict safety standards are applied especially in the point of optical quality for at least five - ten years.

- another side -- this invention -- up to [ current ] -- too low heat-resistant and/or specific electromagnetism -- instability (for example, it is comparatively alike to ultraviolet rays, and, in the case of the liquid crystal grading of a certain kind using an unstable two-color color, applied.) over a line It makes it possible to consider to a sake external (to outdoors) application of "intelligence" grading essentially used internally (to interior of a room).

[0031] By choosing reflexivity coating so that reflexivity coating may adjust that fine sight for the optical appearance of grading, and this reason, an optical function very advantageous to reflexivity coating by this invention can be given. It is not restricted although the "optical modulation" very advantageous type of two sorts is considered.

[0032] Electrochromic type adjustable light transmission nature/In the case of the grading which has light absorption nature, it has already seen the type of the selected electrochemistry system above that it is possible

to set up the limit of a range that the light transmission nature or light absorption nature of grading can change. The same thing is applied to selection of the coloring appearance of grading. For this reason, the color will serve as grading which is a blue field by selection of the electrochromic system which uses tungstic oxide as cathode electrochromic materials.

[0033] If reflexivity coating and such a system which can adjust an optical property correctly by choosing the presentation of reflective coating nature and its thickness especially are combined The optical appearance of grading can be adjusted by various methods. : By choosing reflexivity coating appropriately, the light transmission nature range of grading The contrast (contrast is defined as a ratio of the light transmittance in the condition of having colored completely with the condition of having decreased completely) Without decreasing so that it can evaluate, it falls in the controlled format and gets. Furthermore, reflexivity coating can do the effect of coloring to grading by changing the color on one field of the grading.

[0034] :reflexibility coating by which these points are applied also to photochromic type activity grading can restrict heating of grading, and, for this reason, that property can maintain it, and it can also adjust that optical property.

[0035] Furthermore, when anxious about a fine sight, reflexivity coating is advantageous especially when contained again in the grading which has liquid crystal type adjustable light diffusibility. In this type of grading, generally regardless of whether a watcher is in which side, absolute "symmetrical" appearance is acquired regardless of the transparence appearance in the condition of not being spread, and the appearance in a diffusion condition which is often an opalescence field, and, in the case of the grading in which current sale is carried out by Saint-Gobain Vitrage by the trade name of "Priva-lite", this is applied. However, for the special use, to acquire the capacity to have the optical appearance which changes with sides in which a watcher is is desired now. Reflexibility coating by this invention can obtain this result. The grading which has both an adjustable light diffusibility system and reflexivity coating is because the field of the opposite side which probably has in the part the reflexivity appearance which can adjust a color and reinforcement with the property of this coating with the field which will hold the diffusibility appearance of the opalescence referred to above is especially presented in a diffusion condition. optical -- this type that produces "2 symmetry (disymmetric)" of grading finds out a use to an advantageous thing. For example, use as grading for an automobile like the roof of a vehicle; While a watcher looks at esthetic reflective grading from an outside especially, from the interior of a room, it is the use for which the spreading effect currently searched for is maintained.

[0036] Function that reflexivity coating is another can be given. : By choosing the property and thickness appropriately, it can be electrically used as a conductive layer of a controllable system.

[0037] Much reflexivity coating is advantageously used in the range of this invention, and it deals in it. Reflexibility coating is at least 2, even if it is monolayer coating. You may consist of a laminating more than a layer. Generally, for a reflexivity layer, protecting from a mechanical attack and/or adjusting an optical property is chemical or at least 1 meant. It is used being combined with the dielectric material layer of a layer. Coating is usually 2 of the dielectric material of the type of the oxide of a metal or silicon, or a nitride. Layer (or multiplex layer) At least 1 arranged in between It is used with the gestalt of the reflexivity layer of a layer.

[0038] at least 1 to which a reflexivity layer belongs to the following group Metal of a seed: Silver Ag, Gold Au, Copper Cu, Aluminum aluminum, Chromium Cr, Nickel nickel, Iron Fe, Tantalum Ta, Zirconium Zr, Zinc Zn, Tin Sn, Indium In, Rhodium Rh, and Cadmium Cd -- or -- otherwise, silicon Si (these metals or alloys may be nitrided further) It can choose as the base.

[0039] Reflexibility coating is at least 1. The metal nitride TiN of a seed, for example, titanium nitride, and zirconium nitride ZrN Or nitriding hafnium HfN It can also consider as the base.

[0040] This convention is fulfilled and reflexivity coating especially desirable in the range of this invention is a layer which uses silver as the base. :dielectric layer/contained especially in laminating type Silver larer /dielectric layer, Or dielectric layer/Silver larer/Dielectric layer/Silver larer/It is a dielectric layer. The film which uses as the base the metal which oxidized partially or completely may be among at least one of the two of a layer with which the dielectric adjoined the silver larer, and it has the intention of it acting as a nucleation layer and/or a protective layer especially to oxidation.

[0041] For the further details, EP-506 507, EP-611 213, EP-636 587, EP-638 528, EP-648 342, EP-678 484, EP-709 349, and EP-718 250 will be referred to especially advantageously.

[0042] The grading of another desirable reflecting layer by this invention which fulfills this convention is nickel-Cr which may be nitrided. Or it uses an alloy as the base, it is the layer which uses the steel type of a nickel-Cr-Fe alloy as the base, or uses a tantalum as the base. Especially this layer is Ta 2O5, and SnO2, TiO2 or TiN as indicated by EP-511 901. 2 of the oxide of a type, or a nitride It is arranged between the layers of a layer.

[0043] As indicated in EP-638 527 and especially EP-650 938, it is at least 1 of a TiO2 or SiO x C y type oxide. TiN used combining other layers of a seed It can also be the layer used as the base.

[0044] The publication of the reflexivity layer which uses as the base the silicon used combining the second



layer of an oxide could be seen to FR-2 391 173.

[0045] It is "Antelio" by the layer which uses as the base the metallic oxide which may be doped, especially Saint-Gobain Vitre. The layer which uses as the base titanium oxide like coating of grading currently sold by the trade name, the layer which uses as the base tin oxide  $\text{SnO}_2\text{:F}$  by which the fluorine dope was carried out, or indium oxide ITO by which the tin dope was carried out. The layer used as the base is also contained as a reflexivity layer another type. For the publication of the layered product which contains FR-2 310 977 and  $\text{SnO}_2\text{:F}$  layer in the method of preparation of a titanium oxide layer for a publication for the further details, it is PCT. Application WO94/25 410 EP-544 577 corresponding, EP-573 325, and EP-648 196 will be referred to. Furthermore, it is at a NAZE or at a NAZE/. If the reflexivity layer which used as the base the titanium dioxide partially crystallized at least in the rutile form is chosen, this type of layer also has in coincidence the property which are light catalytic and hydrophilicity, if it adheres to it in one field of the external side of grading, it will comment on offering advantageous cloudy tightness and/or dirt tightness especially, and it will deal in it. For the further details, it will be 9 in 1995. FR95/10 839 for which it applied to the moon 15 day It will be referred to advantageously.

[0046] Probably, especially the thickness must actually be optimized as a function of a desired effect as the function of the degree of "filter-izing" of the sunrays demanded, or a function of modification of the optical appearance investigated, once the material of a reflexivity layer is chosen.

[0047] This invention is applied to an electrochemical type or photochromic type activity grading various type. It is adjustable light transmission nature/of the type indicated by EP-0 338 876 of especially the above for which especially it used viologen or an electrochromic system, EP-0 408 427, EP-0 575 203, and EP-0 628 849 as already seen. The grading which has light absorption nature can be included. It is the conductive layer of transparence,  $\text{H}^+$ ,  $\text{Li}^+$ ,  $\text{Na}^+$ , and  $\text{Ag}^+$  preferably one after another. It is the gestalt of the layered product of the stratum functionale which contains the second conductive layer in the counter-electrode of the so-called gestalt of the second anode electrochromic layer which can pour in a cation reversibly, and the last by the so-called cathode electrochromic layer which can pour in a cation [ like ] reversibly, the electrolyte layer, and request.

[0048] It is 2 as far as the property of the conductive layer of a device is concerned. There is a possible gestalt of \*\*. : Tin oxide  $\text{SnO}_2\text{:F}$  which carried out the fluorine dope, or indium oxide ITO which carried out the tin dope. It is possible to use the material which used the doped metallic oxide [ like ] as the base. Moreover, it is possible to, use Gold Au, Silver Ag, the metal of Aluminum aluminum, or the layer of an alloy for example. Generally a device is 2. Since it has the conductive layer of \*\*, both can use as the base the oxide which is a metal or was doped, or one of the two can use a metal as the base, and it can use as the base the oxide with which another side was doped.

[0049] In order to form the layer of cathode electrochromic materials, it can choose from the group containing tungstic oxide  $\text{WO}_3$ , molybdenum oxide  $\text{MoO}_3$ ,  $2\text{O}_5$ , niobium oxide  $\text{Nb } 2\text{O}_5$ , titanium oxide  $\text{TiO}_2$  and a vanadium-oxide V "SERUMETO" material (being the combination of a metallic material and a ceramic material especially gestalt of the metal particles in a ceramic matrix), for example,  $\text{WO}_3/\text{Au}$ ,  $\text{WO}_3/\text{Ag}$  or tungstic oxide, and the mixture  $\text{WO}_3/\text{ReO}_3$  of ruthenium oxide. In reversible impregnation of a lithium ion, especially these materials are suitable. Although the same material may be used when a device is operated by reversible proton impregnation, hydration is carried out at this time.

[0050] In order to form the layer of anode electrochromic materials, it is  $\text{M} \times \text{A} \text{ y } \text{U} \text{ z}$  (M is transition metals among a formula, and A is ion used for reversible impregnation, it is alkali metal or a proton, and U is oxygen or chalcogen like sulfur.). The material corresponding to a formula can be chosen.

[0051] Proton ion  $\text{H}^+$  Especially in impregnation, it is  $\text{LiNiO} \text{ x}$ ,  $\text{IrO} \text{ x}$   $\text{H} \text{ y}$ ,  $\text{IrO} \text{ x}$   $\text{H} \text{ y}$   $\text{N} \text{ z}$ ,  $\text{NiO} \text{ x}$ ,  $\text{NiO} \text{ x}$   $\text{H} \text{ y}$   $\text{N} \text{ z}$ ,  $\text{RhO} \text{ x}$ , and  $\text{CoO} \text{ x}$ . And  $\text{MnO} \text{ x}$  It can be the mixture of the compound belonging to the included group, or a compound. In reversible impregnation of lithium ion  $\text{Li}^+$ , they are  $\text{LiNiO} \text{ x}$ ,  $\text{LiMn } 2\text{O}_4$ ,  $\text{IrO} \text{ x}$ ,  $\text{Li} \text{ x}$   $\text{IrO} \text{ y}$ ,  $\text{NiO} \text{ x}$ ,  $\text{CeO} \text{ x}$ ,  $\text{TiO} \text{ x}$ , and  $\text{CeO} \text{ x}-\text{TiO}_x$ ,  $\text{RhO} \text{ x}$ ,  $\text{CoO} \text{ x}$ , and  $\text{CrO} \text{ x}$ . And  $\text{MnO} \text{ x}$  The mixture of the compound belonging to the included group or a compound is chosen preferably.

[0052] As far as selection of an electrolyte material is concerned, it is actually 2. It is as there being a type of \*\* and having already indicated above.

[0053] You may be the layer of an anhydrous liquid like [ in the layer of an aqueosity liquid like the water which contains the added sulfuric acid or phosphoric acid in reversible impregnation of a proton, or reversible impregnation of a lithium ion ] the propylene carbonate containing lithium salt. It may be the layer of gel or polymer and is the layer (in this case) of polyethylene oxide and the proton conductive polymer of the type of solid-solution  $\text{PEO}-\text{H}_3\text{PO}_4$  of a phosphoric acid especially again. polymer also constitutes an electronic insulating material -- or -- 2 [ otherwise, ] The trialkoxysilane by which the type of \*\* was graft-ized, and at least 1 3 containing the plasticizer containing the urea radical of an individual You may be the layer which uses as the base the polymer obtained by copolymerization of the precursor of a seed. The lithium ion conductive polymers chosen can be polyacrylic acid or the polymer which uses branching polyethyleneimine as the base,

and an ionomer obtained by partial neutralization of lithium salt. The patent reference quoted to this application for the further details about the property of such a polymer product and composition will be referred to advantageously.

[0054] However, you may be the electrolyte of the gestalt of a solid material and a metallic oxide may be especially used as the base. According to another gestalt of this invention, it is chosen so that a system may contain the layer of only a solid material. It is all the materials with which a "solid-state (solid) material" has a solid mechanical action in the context of this invention, and is especially essentially an inorganic material, or is an organic material, or they are all hybrid materials, i.e., organic. – Sol from an inorganic precursor – It is inorganic partially and meaning a material like the material which can be obtained by gel adhesion which is organic partially is meant. The so-called "all solid" system configuration has an advantage in respect of the ease of manufacture, and is acquired. When a system actually contains the electrolyte of the gestalt of the polymer which does not have solid machine behavior This is 2 to juxtaposition in practice. It is required that the "half cel" of \*\* should be manufactured. The each A coat is carried out in the first conductive layer, and it consists of a carrier base material by which the coat was carried out by the second electrochemistry barrier layer, and is these 2. Next, the "half cel" of \*\* is assembled by inserting an electrolyte among them. With an "all solid" gestalt, since all the layers of a system can adhere mutually on a single carrier base material, manufacture is simplified. Electrochromic system/For this reason, a carrier base material unit is manufactured more lightly. Because, it is 2 like usual. It is because it is satisfied with a single carrier base material instead of the carrier base material of \*\*.

[0055] Furthermore, although ion can be reversibly poured in even if an electrolyte is a "solid-state", or even if it is not so, the degree of the oxidation can essentially contain the layer of a fixed ion conductivity material. It is FR-96/03799 of especially the above. You may be the material which has an electrochromic characteristic which is indicated.

[0056] Adjustable light transmission nature/of the configuration by this invention For this reason, the system which has light absorption nature is 2. It turns out that it may be arranged between the rigid base materials of \*\*, or may be arranged more in details at a single rigid base material top in the case of an "all solid" system. A rigid carrier base material may be preferably manufactured from glass, acrylic polymer, a polycarbonate, or specific polyurethane.

[0057] Regardless of the gestalt to adopt, it is PVB (polyvinyl butyral). EVA (ethylene-vinyl acetate) Or PU (polyurethane) The interlayer of the sheet of the affinity polymer of a type is minded and it is to an electrochromic system. At least 1 of the carrier base material of one sheet, or a carrier base material Carrying out a laminating to \*\* may be performed.

[0058] At least 1 of a carrier base material \*\* may be used in combination with another rigid base material through the interlayer who is a gas interlayer. Grading can turn into multiplex grading which has adiathermic [ which was strengthened ] after that, especially double grading. it equips with this laminated structure as adiathermic double grading -- it can have -- that sequence -- for example, glass 1 / reflexivity coating/Sheet / glass 2 / electrochromic system/Glass 3 / gas middle class/Glass 4 it can be (this multiplex grading gestalt -- moreover, when a controllable system is a liquid crystal type electrically, adopted.) . [ of affinity polymer ]

[0059] Reflexibility coating is activity (electrochromic) preferably. It is arranged on one field of other base materials which are arranged on the field of a system, and one field of the carrier base materials of the opposite side, or constitute grading. For this reason, grading is able to show the following sequence.

[0060] Glass 1/Reflexibility coating/Sheet [ of affinity polymer ]/Glass 2/electrochromic system/Glass 3. This reflexivity coating is glass 2 facing the sheet of affinity polymer independently. It will be glass 1, if it is arranged on a field or has enough machines and chemistry endurance. It can be arranged on an external side. This laminated-structure object is glass 1 / reflexivity coating/. Sheet [ of affinity polymer ]/Glass 2 / electrochromic system/Glass 3 / gas middle class/Glass 4 It has sequence and can be equipped as adiathermic double grading.

[0061] By including the so-called optical bulb or a liquid crystal system which was especially explained in the above again, it is chosen and deals in the grading concerning this invention so that it may have adjustable light diffusibility. In the case of a liquid crystal system, a polymer matrix and the property of a crystal are the ordinary index of liquid crystal. no Refractive index of polymer  $n_p$  It is carefully chosen so that equally.

[0062] Irrespective of any shall be contained between an optical bulb or a liquid crystal system, both systems are the gestalten of the complex film of the polymer base. It is 2 in order to secure the electric supply. It is arranged between the conductive layers of \*\* and a conductive layer is a layer of the type used especially in the layer of transparency and the above for an electrochromic system.

[0063] furthermore, polymer – it should note the drop let of the liquid crystal of liquid crystal complex also containing the mixture of a color or a color, and containing with the gestalt of the two-color color which is a color by which orientation can be especially carried out with liquid crystal, and which shows an absorption

anisotropy -- it is.

[0064] 2 [ furthermore, ] the film which has the conductive layer of a layer -- usually -- the field -- at least -- an one side top -- and it has a carrier base material in each of that side preferably. Generally it is transparent. It may be chosen so that it may be rigidity or semi-rigid, for example, it is manufactured from glass, polymethylmethacrylate PMMA type acrylic polymer, or Polycarbonate PC. It may be flexibility and is especially polyethylene terephthalate PET again. It is a thing or let a specific flexible polycarbonate be the base. For this reason, they are PET/ITO / polymer. -- You may have liquid crystal complex / ITO/PET type structure, and it is the gestalt of a flexible sheet and it can be dealt with easily. This unit (complex + conductivity layer + at least 1 carrier base material of a layer) Next, polyvinyl butyral PVB Or ethylene -- Vinyl acetate EVA A type or at least 1 of specific polyurethane PU By assistance of the organic polymer of the affinity of a layer, it is at least 1. A laminating can be carried out to the glass type transparence rigidity base material of \*\*.

[0065] According to this type of the grading which has adjustable optical diffusibility of desirable gestalt, reflexivity coating by this invention faces the system side containing liquid crystal, and is arranged on the field of one of carrier base materials. However, it may be arranged on one field of other base materials which constitute grading, or the field of the opposite side of the field. For this reason, grading can have the following sequence. Glass (1) / reflexivity coating/Sheet [ of affinity polymer ]/Sheet [ of flexible polymer ]/Liquid crystal system/Sheet [ of flexible polymer ]/Sheet [ of affinity polymer ]/Glass (2) . applied in the case of electrochromic grading -- as -- reflexivity coating -- or -- especially -- glass 1 It may be arranged on an external side.

[0066] Irrespective of any of the system in which an electrochromic type or liquid crystal type electric control is possible are included, the configuration of double grading can be chosen so that the carrier base material of a system in which electric control is possible may be separated from the base material which has reflexivity coating by this invention by the gas interlayer. There are the following grading types. Glass 1/reflexivity coating/Gas interlayer/At least 1 Glass 2 of \*\* System which is combined and used and in which electric control is possible.

[0067] Probably, it will be desirable to offer the further property of reducing the light transmission nature and/or energy permeability, from a viewpoint of proposing the grading which shows the sunrays-proof nature which improved or the vision amenity improved when there was nothing as if, \*\*\*\* tightness, or predetermined coloring appearance, even if it can consider the system in which what type of electric control is possible. In this case, at least 1 of the base material of grading It can be chosen so that \*\* may be absorptivity about light and/or energy, and it can be chosen so that it may be the gestalt of the base material with which the whole is especially colored in a format remarkable to some extent. If it is used in order that reflexivity coating may protect the system in which electric control is possible to sunrays, of course, as for the base material with which the whole is colored, it is desirable to consider as the configuration of grading which is separated from the base material in contact with reflexivity coating by the system in which electric control is possible at least, for example, it has the following type. 1/reflexivity coating of clear glass / ... the system in which /liquid crystal type electric control is possible / ... / Colored glass 3 it is -- here -- a dotted line -- at least 1 The sheet of the rigid base material of the material of a seed and affinity polymer or a gas interlayer's type is shown.

[0068] By equipping with grading into a building or a vehicle so that clear glass may be outside suitable, the system in contact with absorptivity glass in which electric control is possible can prevent heating.

-- Like [ in the case of an electrochromic system ], when the system in which electric control is possible has adjustable absorptivity, it tends to be heated by strong sunlight according to a energy-absorbing phenomenon in a coloring condition, and, so, actually has the advantage of reflexivity coating by this invention (the same comment is applied also to optical chromogen (photograph chromium)).

-- The system in which electric control is possible is a liquid crystal type, or is a system which has electrochromic type adjustable absorptivity, and in order to avoid being heated by contact to colored glass even if itself is not absorptivity when it is in a disappearance condition, it is more desirable to avoid contact to the colored glass which receives sunlight directly.

[0069] It is the grading which the whole is colored and what is placed especially into a building is sold by Saint-Gobain Vitrage by the trade name of "Parsol". The glass of other types which have the reduced energy permeability is also advantageous in the range of this invention.

[0070] Especially these are U.S. Pat. No. 4,190,542 and the 4,101,705th. It is glass of a bronze color as indicated by the number, or it is glass which mainly adjusted the constituent in consideration of the automobile grading use. it -- for example, TSA+ or the glass called TSA++ -- it is -- Fe 2O3 and FeO And CoO A contained part of the coloring nature oxide of a type is adjusted so that it may have the selectivity specified when the ratio of T L/T E is at least 1.30, or 1.40-1.50, and it is the color of a green field. For the further details, Europe patent application EP-A-0 616 883 will be referred to advantageously. A part for the contents of the above-mentioned coloring nature oxide in the glass constituent by instruction of this patent specification will be described briefly [ below ] (weight rate). According to the first series, it is Fe 2O3. 0.55-0.62%FeO 0.11-0.16%CoO 0-12 ppm, it is

<12ppm especially and is Fe<sup>2+</sup>/Fe especially. A ratio is about 0.19–0.25. According to the second series, it is Fe<sub>2</sub>O<sub>3</sub> 0.75–0.90%FeO 0.15–0.22%CoO 0–17 ppm, it is <10ppm especially and is Fe<sup>2+</sup>/Fe especially. A ratio is about 0.20.

[0071] It is blue especially as indicated by patent application EP-A-0 644 164. – It is a green field, and you may be glass colored the whole and the presentation is described below.

SiO<sub>2</sub> 64 – 75%aluminum 2O<sub>3</sub> 0 – 5%B–2 O<sub>3</sub> 0 to 5% CaO 2 to 15% MgO 0 – 5%Na<sub>2</sub>O 9 – 18%K<sub>2</sub>O 0 –5%Fe<sub>2</sub>O<sub>3</sub> 0.75–1.4%(iron of the sum total expressed in this form) FeO 0.25 – 0.32%SO<sub>3</sub> 0.10 – 0.35% [0072] It is application FR-A –2. 721 You may be glass which is indicated by the PCT application corresponding to 599 for which it applied by the application number of PCT/FR 95/00828 on June 22, 1995. Weight % describes the presentation. SiO<sub>2</sub> 69 – 75%aluminum 2O<sub>3</sub> 0 – 3%B–2 O<sub>3</sub> 0 to 5% CaO 2 to 10% MgO 0 – 2%Na<sub>2</sub>O 9 – 17%K<sub>2</sub>O 0 –8%Fe<sub>2</sub>O<sub>3</sub> (total iron) 0.2 – 4%Se, CoO and Cr 2O<sub>3</sub>, NiO, CuO 0 – 0.45% [0073] a contained part of coloring agents other than iron -- at least 0.0002% it is -- here -- Fe<sub>2</sub>O<sub>3</sub> a contained part -- 1.5% or less -- it is -- this constituent -- a fluorine, zinc, a zirconium, a selenium, a titanate-acid ghost, and less than 4% of barium oxide -- it can contain -- the sum total of the percentage of an alkaline-earth-metal oxide -- 10% It is the following.

[0074] Still more, according to instruction of this patent specification, it is desirable to be itself or to introduce coloring agents other than iron into a glass constituent in combination, and according to weight content, it is preferably less than the next limit.

Se <0.008%CoO <0.04%Cr 2O<sub>3</sub> <0.1%NiO <0.07%CuO <0.3%[0075] It will be 3 at 03858 the 95th/of an application number in 1995 again. Correspond to the France patent application for which it applied to the moon 16 day. 1996 year 3 It can be glass which is indicated by PCT/FR 96/00396 for which it applied to the moon 14 day. This glass weight criteria -- writing -- the form of Fe<sub>2</sub>O<sub>3</sub> -- writing -- the iron of 0.85 – 2% of sum total -- containing -- FeO a part for weight content -- 0.21 – 0.40% it is .

[0076] According to the first series, the presentation is as follows according to this patent specification.

SiO<sub>2</sub> 64 – 75%aluminum 2O<sub>3</sub> 0 – 5%B–2 O<sub>3</sub> 0 to 5% CaO 2 to 15% MgO 0 – 5%Na<sub>2</sub>O 9 – 18%K<sub>2</sub>O 0–5%Fe<sub>2</sub>O<sub>3</sub> 0.85 (iron of the sum total expressed in this form) –2%FeO 0.21 –0.40%CoO, Cr 2O<sub>3</sub>, Se, TiO<sub>2</sub>, MnO and NiO, CuO It is 30.08 – 0.35% of 0 – 0.04%SO<sub>3</sub>. According to the second series, it is as follows.

SiO<sub>2</sub> 68 – 75%aluminum 2O<sub>3</sub> 0 – 3%B–2 O<sub>3</sub> 0 to 5% CaO 2 to 10% MgO 0 – 2%Na<sub>2</sub>O 9 – 18%K<sub>2</sub>O 0–8%Fe<sub>2</sub>O<sub>3</sub> 0.95 (iron of the sum total expressed in this form) –2%CoO, Cr 2O<sub>3</sub>, Se, TiO<sub>2</sub> and MnO, NiO, CuO 0 to 0.04% FeO 0.29 – 0.40%SO<sub>3</sub> It is 0.08 – 0.35%.

[0077] It can be glass colored by instruction of Europe patent EP-0 452 207 again, and the presentation is a weight ratio and, generally is as follows.

SiO<sub>2</sub> 64 – 75%aluminum 2O<sub>3</sub> 0 – 5%B–2 O<sub>3</sub> 0 to 5% CaO 5 to 15% MgO 0 – 5%Na<sub>2</sub>O 10 – 18%K<sub>2</sub>O 0 – 5% -- it is -- the total quantity of an alkaline-earth-metal oxide -- 6 – 16% it is -- the total quantity of an alkali-metal oxide -- 10 – 20% it is -- and Fe<sub>2</sub>O<sub>3</sub> (total iron) as a coloring agent 1.4 to 4% CoO 0 – 0.05% -- containing -- Fe<sub>2</sub>O<sub>3</sub> -- < the time of about 2% -- CoO > About 0.02% it is -- A selenium and chrome oxide may be included and the sum total of CoO+Se+Cr 2O<sub>3</sub> is 0.24%. It can reach. This glass At the thickness of 3.85mm, it is about 20%. The following emitters A Light transmittance as the whole bottom (LT A) It has and is about 12%. The following is energy permeability (TE) as a whole. It has.

[0078] The glass with which the presentation corresponding to the presentation specified to WO 93/07095 was colored as follows can be mentioned, and this is also a weight ratio.

SiO<sub>2</sub> 64 – 75%aluminum 2O<sub>3</sub> 0 – 5%B–2 O<sub>3</sub> 0 to 5% CaO 5 to 15% MgO 0 – 5%Na<sub>2</sub>O 10 – 18%K<sub>2</sub>O It is 0 – 5%. As a coloring agent Fe<sub>2</sub>O<sub>3</sub> (total iron) 0.45 –2.5%CoO 0.001 – 0.02%Se 0–0.0025%Cr 2O<sub>3</sub> It is 0 – 0.1%. such glass -- emitter A The light transmittance in the bottom (LT A) The energy permeability as the low whole (TE) having -- the thickness of 3.85 millimeters -- it is -- permeability TE 10 – 48% it is -- and the permeability LT A -- 20 – 60% it is .

[0079] For all the types of the constituent of colored glass, so, grading is 20 – 60% 6 to 70% especially advantageous. Energy permeability and 10 – 85% It will be chosen so that it may have light transmittance.

[0080] Especially another theme of this invention is using the above-mentioned grading as a wind screen awning strip as a wind screen especially as grading for a building as automobile grading like the roof of a vehicle, the grading of a train, or grading of the aircraft as grading equipped by the transportation means as external grading, internal partition grading, or a grading door.

[0081] Such grading [ whether it has "monolithic" structure, namely, has a single rigid base material and ] Or the laminating of two or more rigid base materials is carried out, and/or can have multiplex grading structure, or if there is nothing as if Have the external plastic layer which used as the base especially the polyurethane that has endergonic. It can have the so-called unsymmetrical grading structure, and especially this structure is indicated by EP-191 666, EP-190953, EP-241 337, EP-344 045, EP-402 212, EP-430 769, and EP-673 757.

[0082] The grading of this invention can be used also as a mirror by adjusting the property and thickness of reflexivity coating again. More in details It can be used as a mirror which can also be called a "spy mirror" and by which silver plating is not carried out. : Supposing it replaces the silver plating of a mirror by the liquid crystal

type adjustable light diffusion system Supposing it further wishes, it not only can observe the interior of the room which adjoins without noticing what the indoor watcher is seeing to those who are in the adjoining room, but a watcher It can avoid \*\*\*\*\* [ be / it / the mirror by which silver plating is not carried out to those for whom close comes indoors ] by making grading into diffusibility.

[0083] Other the advantageous details and features of this invention will become clear from the explanation which referred to the attached drawing shown below.

[0084] These drawings are made extremely typical in order to make it legible, and they are not in agreement with the rate of shown various components. Especially no obvious electrical connection is shown.

[0085] The rigid base material used for all the following examples is 4mm. Silica of thickness – It is the base material made from soda-lime glass (the thickness can be chosen in 3–6mm especially in fact.).

[0086] Below, the so-called “transparence” glass base material is glass currently sold by Saint-Gobain Vitrage by the trade name of Planilux. The so-called “coloring” glass base material is about 4mm. It is thickness and is an emitter D65. It is 35% in the bottom. T L And 18.7% T E It is glass in which a value is shown. The chemical composition is Example 2 of the above-mentioned patent WO 93/07095. Prescribed by chemical composition, it is a weight ratio and contains the following oxide which affects a color.

Fe 2O<sub>3</sub> (total iron) 1.65%Co 0.00110% [0087] example 1 – 3 Drawing 1 It refers to and is related with electrochromic grading.

[0088] example 1 drawing 1 For example, the :2 sheet clear glass 2 in which the electrochromic grading of the laminated structure containing the glass of three sheets is shown in the configuration adjusted so that it might be used as a roof of a vehicle and 3 it is shown -- having -- \*\*\*\* -- the meantime -- stack (stack by instruction of Europe patent EP-0 628 849) of the following stratum functionale from -- becoming electrochromic system 4 It is arranged.

– 300nm SnO<sub>2</sub> : Oxidation Iridium (it May be Replaced with Nickel Oxide by Which Hydration was Carried Out) to which Hydration of First Conductivity Layer of F and the –55 nm was Carried Out from -- Tantalum Oxide (Ta 2O<sub>5</sub>, Hx) to which Hydration of First Pass of Made Anode Electrochromic Materials and the –70 nm was Carried Out Layer (Function as a Protective Layer)

– Solid Solution of Polyethylene Oxide with 100-Micrometer Phosphoric Acid (PEO-H<sub>3</sub>PO<sub>4</sub>) \*\*\*\*\* -- SnO (Second Layer of Cathode Electrochromic Materials Which Used Tungstic Oxide (Electrolytic Layer and –350nm) as Base, and –300nm) 2 : Second Layer [0089] of F Glass 2+ Electrochromic system 4+ Glass 3 About a unit, it is PVB with a thickness of 0.75mm especially 0.5–1mm next. Sheet 5 of the organic affinity polymer of a type An interlayer is minded and it is the third clear glass 1. A laminating is carried out. PVB Sheet 5 Glass 1 which meets a field Reflexibility coating 6 which consists of a stack of the following films on a field It is arranged. glass 1 from -- beginning –41nm The layer of SnO<sub>2</sub>, and –18nm –74nm of silver first passes –12nm of SnO two-layer Layer [ second ] –33nm of silver SnO 2 It is a layer.

[0090] Furthermore, on each both sides of a silver larer, it is about 0.5–1.5nm. nickel-Cr The thin metal layer used as the base is arranged.

[0091] Assistance of a magnetic field is obtained with the technology of carrier beam cathode sputtering as known, and this type of stack is nickel-Cr. Then, between the SnO two-layer adhesion by reactive sputtering under existence of oxygen, a layer prevents that a silver larer oxidizes and oxidizes partially or completely.

[0092] (dielectric/Silver) n Type (n>=1) About other types of an equivalent stacking The patent specification quoted before will be referred to advantageously (in this way). Dielectric materials other than tin oxide may be used, are TiO<sub>2</sub>, ZnO, Nb, Ta 2O<sub>5</sub>, and Si<sub>3</sub>N<sub>4</sub> grade, or are multilayer arrangement of a dielectric material like SnO<sub>2</sub>/Nb 2O<sub>5</sub>, Nb2O<sub>5</sub>/ZnO, and SnO<sub>2</sub>/Ta2O<sub>5</sub> grade. Similarly, it is nickel-Cr. A barrier layer may also be used and you may replace in Ti, Ta, Nb, Zn, Sn, and a metal layer same type. .

[0093] Such grading is glass 1 preferably. It is equipped so that it may be outside suitable. Electrochromic system 4 For this reason, it is PVB which contains preferably the drugs which intercept an ultraviolet region. Sheet 4 And it is especially protected from sunrays by both reflexibility coating 5 by this invention. 2 That function of especially this coating by the reflecting layer of a layer is effective as a solar light filter. When using grading as a roof of a vehicle (i.e., when using by the vertical position which requires a load especially for an electrochromic system in respect of a temperature action), or when [ if this is going to use it as the Green House grading, a skylight type roof window, etc., ] using in the location to which was received perpendicularly and it leans, it is boiled comparatively and is more important.

[0094] Example 2 -- this -- drawing 2 It corresponds to the shown electrochromic grading configuration. : Drawing 1 Glass 1, 2, and 3 here -- it is also -- this PVB A sheet 5 and this reflexibility coating 6 And this electrochromic system 4 It is. This 3 A \*\* glass unit is the argon 8 with a thickness of 12mm. It is the fourth clear glass 7 through the middle class of a layer in assistance of the means of the assembly which is known in the field of double grading and is not shown. Assistance is obtained and it is equipped as double grading.

[0095] Argon layer 8 Glass 7 which has met On the field, coating which has the low emissivity of the type applied to the grading currently sold by Saint-Gobain Vitrage by the trade name of Planitherm is arranged. That

is, it is the following stack.

- 40nm The layer of tin oxide, the layer of -9nm silver, and -40nm the layer of tin oxide -- coming out -- the above-mentioned stack 6 0.5-1.5nm by which it has the intention of protecting silver from oxidation like to a case nickel-Cr 2 The film of \*\* is included. This type of especially (EP- 0 575 it is indicated by 207 like) double grading is, It can be used as external grading with which the transverse plane of a building is equipped, or can be used in Green House, a veranda, or a roof window.

[0096] This type of structure is 2. The advantage of \*\* is also hung down. : When all the grading in transverse plane of a building changes from an esthetic viewpoint to a coloring condition reflexivity coating 6 when it is, esthetic reflective appearance is presented on the lateral surface to a transverse plane, and when it sees from outside, this grading has it without having thematic reflexivity coating -- will come out and I will be -- it is dark and more desirable [ it is comparatively alike, and ] than the appearance of absorptivity -- I will come out.

[0097] Drawing 1 and the wearing object by 2 protect electrochromic grading from a viewpoint of protection over heat effectively to too much heating.

[0098] Silver layer (SnO<sub>2</sub> : made of it or F) The second coating 9 of the low radioactivity type used as the base It does not contribute to the effect of protection over an electrochromic system. Although it is arbitrary, if it exists, it can improve adiathermic [ of double grading structure ] and is a coefficient K especially. It is improvable by falling (a coefficient K is the temperature gradient of 1 \*\* between the interior of a room and outdoor, and shows the heat rate of flow which passes the wall of 2 1m.).

[0099] It is Example 1 about the next spectrophotometry value of the minimum coloring condition CS and the maximum disappearance condition FS. And 2 It is related and is the following table 1. It collects. emitter D65 it is -- light transmittance T<sub>L</sub>, the energy permeability TE, and the rate EA of energy-absorbing -- it is -- percentage -- it is -- coefficient K It is Wm<sup>-2</sup> \*\*K<sup>-1</sup>, is the sunlight factor SF specified as a ratio of the energy of the sum total to which close comes through grading in the room to incidence solar energy, and is a non-dimension.

[0100] example 2 Although it corresponds to \*\*\*\*\*, it is the low radioactivity coating 9. Example 2 which is not included It is Example 2 as 2 and a comparison. Example 2 which does not include the reflexivity coating 6 by this invention although it corresponds 3 Table 1 It is shown.

[0101]

[A table 1]

表 1

	例 1		例 2		例 2の 2		例 2の 3	
	CE	FE	CE	FE	CE	FE	CE	FE
T <sub>L</sub>	10	48.4	8.5	41.5	9.1	44.2	10.2	50
T <sub>z</sub>	4.9	25.2	4.0	19.8	4.4	22.2	5.3	29.2
EA	58.8	38.4	59.0	39.8	59.1	39.5	84.2	53.7
SP	0.20	0.36	0.08	0.25	0.12	0.28	0.11	0.37
K	5.6	5.6	1.4	1.4	2.6	2.6	1.4	1.4

[0102] this table to example 2 Compared Example 2 2 setting -- low radioactivity stack 9 if it loses -- the rate of energy-absorbing -- effect -- not doing -- coefficient K and a sunlight factor -- some -- a sacrifice -- carrying out -- T<sub>L</sub> of grading It turns out that the minimum value can be raised 3%. It will depend on a use, climate, etc. which were meant. [ whether which configuration is chosen ]

[0103] example 2 And example 2 3 It is Example 2 when it compares. Existence of reflexivity coating does not spoil contrast, and although the light transmission nature of grading is spoiled very much a little, it also turns out very intentionally that the rate of energy-absorbing can be fallen.

[0104] Furthermore, example 1 And 2 It is related with each of a configuration. Grading by the vertical position 850 W/m<sup>2</sup> When exposure to the sunlight equivalent to energy is given About the maximum skin temperature of grading, it is protective coating 6. It measures as compared with the same grading which is not used, and is Example 1. And 2 The maximum temperature of the grading to depend is coating 5, although it is in a coloring condition, and it is 69 degrees C even if high. When there is nothing, it turns out that it is 83 degrees C. Since this difference among 14 degrees C can prolong the life of electrochromic grading, it is very important.

[0105] Furthermore, electrochromic system 4 of an "all solid" If it chooses drawing 2 what was shown -- "light" double grading structure, especially glass 1 / electrochromic system/Gas reservoir/Glass 2 It is possible to have a type and it has the endurance as which; reflexivity coating is demanded. For example, reflexivity coating will be glass 1 if the same TiO<sub>2</sub> as coating which the grading currently sold by the trade name of Saint Gobain Vitrage has equipped is used as the base. It can be arranged on external surface.

[0106] Example 3 -- this -- drawing 3 a configuration -- corresponding -- it -- drawing 2 it has the same

component (however, there is no low radioactivity stack 9) -- the electrochromic double grading which is a different assembly is shown.

[0107] Glass 1 with which turning outside here when equipping with grading is meant Reflexibility coating 6 A laminating is not had and carried out. Electrochromic system 4 So, it is glass 7. 3 It is in between and is glass 3. PVB sheet 5 An interlayer is minded and it is glass 2. The laminating is carried out. Glass 2 and 3 And 7 Next, as double grading, a unit minds an argon layer and is glass 1. It is equipped and is glass 1. It is the reflexibility coating 6 on the field facing an argon layer. It has.

[0108] As stated above, many of other gestalten of the electrochromic grading by this invention are possible. For this reason, it is Example 3. It is glass 2 although it has a configuration. And PVB sheet 5 It loses, namely, is glass 3. It is possible to avoid to carry out a laminating.

[0109] "All solid" electrochromic system 4 It adopts. For example, the stack, -300nm SnO<sub>2</sub> which are shown below : F conductivity layer, - Layer of Cathode Electrochromic Materials Made from 380nm Tungstic Oxide, - 18nm Layer of Tantalum Oxide Ta<sub>2</sub>O<sub>5</sub> and NH<sub>2</sub>O, and Hydrated 200nm Double Layer Electrolyte Which Consists of a Layer of Hydrated Tungstic Oxide WO<sub>3</sub> and NH<sub>2</sub>O, - 45nm Hydrated Oxidation Iridium H X IrO Y (it Can Also Replace with Hydrated Nickel Oxide) Layer of Anode Electrochromic Materials Used as Base, - 200nm ITO If a conductive layer is adopted, it will be glass 1/. The reflexibility coating 6/the 8/electrochromic system 4 of gas reservoirs/glass 2 2 of a type It is possible to have the double grading structure using the glass of only \*\*.

[0110] The following examples 4-6 show liquid crystal grading.

[0111] Example 4 -- this example -- drawing 4 Liquid crystal grading as shown is referred to. It is 2. The clear glass 10 and 11 of \*\* is included and it is 0.75mm PVB to the meantime. Sheets 12 and 13 are arranged and it is 175. The polyethylene terephthalate PET 14 of the thickness of the micrometer and the sheet of two sheets of 15 are surrounded, and there is a liquid crystal system 16 with a thickness of 25 micrometers in between them. Manufacture is actually 2. It is carried out at a production process and they are PET/ITO / polymer liquid crystal complex / ITO/PET to the beginning. A film is manufactured and then the laminating of the film is carried out to glass 10 and 11 by assistance of sheets 12 and 13.

[0112] Furthermore, glass 11 and PVB Between sheets 13, it is the reflexibility coating 5. The same reflexibility coating 17 occurs and it is 2. Although it has the layer of the silver of a layer The thickness of a silver layer differs and the stack 17 is as follows (based on instruction of Europe patent EP-638 528). : layer of SnO<sub>2</sub> of - 34.4 nm - The first pass of silver of 12 nm, - the layer of SnO<sub>2</sub> of 98 nm, the second layer of silver of -18 nm, and the layer of SnO<sub>2</sub> of -35 nm -- further -- each field top of the layer of each silver -- about 1.5nm The layer of the thin metal of Nb is arranged.

[0113] The liquid crystal system 16 is PET. 100 to which it adhered on [ each ] the sheet Ohm/ITO of a square 2 Including the transparence conductivity layer of \*\*, there is transparence polymer liquid crystal complex between them, the micro drop of a nematic liquid crystal distributes in advance in polymer, and it consists of said polymer which forms the liquid crystal emulsion. The liquid crystal system used is Priva-lite by Saint Gobain Vitrage to the thing of the type indicated by WO-90/03593, U.S. Pat. No. 5,206,747, and EP-0 409 442, and a list. It is the thing of the type currently sold by the trade name. It is 110V / 50Hz. It becomes transparence when electric power is operated and supplied on voltage. It will become diffusibility if electric supply is stopped. If a two-color color is introduced into the drop let of liquid crystal, coating 17 functions as an ultraviolet-rays filter partially at least, and protecting it should attract attention. This ultraviolet-rays effect can be strengthened by being an outside and using the glass which has the ultraviolet-rays prevention screen effect.

[0114] Example 5 -- this example 5 the thing about the type of liquid crystal grading -- it is -- it -- drawing 4 It is shown and same PET/ITO / polymer liquid crystal complex / PET/ITO liquid crystal systems 14, 15, and 16, and the same reflexibility coating 17 are used. It is here, however glass 11 is only 2mm. It is glass with which it is thickness and the second glass 10 was colored the whole as mentioned above, and is 4mm. It is thickness. Furthermore, PVB Sheets 12 and 13 are replaced with the 0.65mm sheet made from polyurethane.

[0115] Emitter D65 About the next photometry value in the bottom, it is ISO. Standard 9050 is referred to and it is the following table 3. And 4 It set and arranged. example 4 And 5 To each : The light transmittance T L in % , and lambdadam in the rule transmitted wave length in nm (T), % Transmitted color purity pe (T) The energy permeability T E in % , The rate R L of a base material 11 "side" light reflex, its rule wavelength, and its purity lambdadam (R L) And pe (R L), Rate R'L of a base material 10 "side" light reflex, its rule wavelength, and its purity lambdadam (R'L) And pe (R' L) It is shown. The energy-absorbing value and the cloudy value H which are specified in the sunlight factor SF and list which were already explained above by the optical diffusion ratio in % It is provided. Electric power is not supplied to "ON" condition which is in a transparence condition when electric power is supplied to grading, and grading, but all these values are shown in the state of "OFF" at the time of being diffusibility.

[0116]

[A table 2]



表 3

例 4

	「オン」	「オフ」
$T_L$	37.6	33.8
$\lambda \text{ dom}(T)$	571	559
$P_e(T)$	18.17	9.15
$R_L$	15.45	14.8
$\lambda \text{ dom}(R_L)$	485	485
$P_e(R_L)$	32.1	32.2
$R'_L$	22.5	20.65
$\lambda \text{ dom}(R'_L)$	480	480
$P_e(R'_L)$	8.94	7.92
EA	48.75	52.3
SF	30.5	28.7
H	< 8	> 97
$T_E$	19.03	16.02

[0117] : which measured the spectrometry value of the grading which does not use reflexivity coating by this invention although it was the same configuration as the grading of Example 4 as a comparison -- such grading -- R'L The same R L as a value a value -- having -- "ON" condition -- 18.4% it is -- and "OFF" condition -- 16.5% it is . the same -- R L And R'L even if grading is in "OFF" condition, or even if rule wavelength is in "ON" condition -- the same -- and 491nm it is . Whether grading is in "ON" condition or the purity value related to a reflection factor is also in "OFF" condition, it is the same, and it is 5.2%. The sunlight factor SF is 67 in the state of "ON", and is 65 in the state of "OFF." light transmittance -- always -- 569nm equal rule wavelength and purity always equal to 4.3 - 4.4% -- being related -- "ON" condition -- 73.5% it is -- and "OFF" condition -- 70.8% it is .

[0118]

[A table 3]

表 4

例 5

	「オン」	「オフ」
$T_L$	15.7	14.6
$\lambda (T)$	528	525
$P_e(T)$	8.9	8.7
$R_L$	16.0	16.3
$\lambda \text{ dom}(R_L)$	486	486
$P_e(R_L)$	30.0	29.7
$R'_L$	7.8	7.2
$\lambda \text{ dom}(R'_L)$	490	491
$P_e(R'_L)$	12.1	10.3
EA	58.3	58.9
SF	22	21.5
H	< 8	> 97
$T_E$	6	5.3

[0119] :  $T_L$  in which the next conclusion is drawn from these data and deals And  $T_E$  Especially level "can be adjusted" by selection of the transparence or the colored base material of glass. If the reflexivity coating 17 is required, it will form a heat screen for a liquid crystal system. It is especially the lateral surface (glass 11). And medial surface (glass 10) Upwards different reflexivity appearance can be acquired. for example, R L And R'L a



value -- 10% 2 of color purity [ in / in color purity / in / it differs closely and / outside reflection / inside reflection ] High more than twice -- When there is a transparency reflection effect and grading is seen from an outside, they are blue or blue. -- There is a strong color of a green field, and the effect is not so remarkable when grading is seen from the inside. Grading has the same appearance completely in inside reflection and outside reflection, and it has checked that the appearance of the grading in "ON" condition was opalescence in respect of each without reflexivity coating.

[0120] the last -- table 4 from -- if the colored glass is used -- inside reflective value R'L It turns out that it falls and gets.

[0121] so, the thing seen for the room or a compartment from an outside in this type of grading -- since -- it is possible to adjust that optical diffusibility so that it may protect. Furthermore, carrying out a deer, a lateral watcher is the good color of appearance and will look at the reflexivity grading which has the esthetic appearance searched for very much now, whether it is in a diffusion condition or he is not so.

[0122] When this invention can adjust the external reflective appearance of liquid crystal grading in coloring for this reason and a vehicle is equipped with this type of grading, it is very advantageous especially. : For example, it is possible to adjust the appearance of the grading seen from the outside as a function of the color of a body work.

[0123] Example 6 -- this example -- drawing 5 corresponding -- it -- drawing 4 The liquid crystal grading of a type is shown. At this time It is equipped as double grading. : Glass 10/PVB 12/PET 14/Liquid crystal system 16/PET 15/PVB13/glass 11/A laminated structure is seen also here. The laminating of it is carried out to the third clear glass 18 through the argon layer 19, and clear glass 18 has the reflexivity coating 17 on the side which the argon layer has met. It is meant that glass 18 has turned to glass 18 outside when equipped with grading.

[0124] Furthermore, the functional exertion of the grading indicated by all these examples is carried out by having hydrophobic coating of the rainfall-proof nature which uses the dirt prevention coating 2, for example, the above TiO(s) crystallized partially at least, or the fluorinated silane polymer as the base at the lateral surface.

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[Translation done.]

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**DESCRIPTION OF DRAWINGS**

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[Brief Description of the Drawings]

[Drawing 1] It is the electrochromic grading which has a laminated structure in a cross section.

[Drawing 2] It is electrochromic grading given in drawing 1 with which it is equipped as double grading.

[Drawing 3] It is the electrochromic grading with which it is equipped as double grading by another gestalt.

[Drawing 4] It is the liquid crystal grading in a cross section.

[Drawing 5] It is the liquid crystal grading with which it is equipped as double grading.

[Description of Notations]

- 1 -- Glass
- 2 -- Glass
- 3 -- Glass
- 4 -- Electrochromic system
- 5 -- PVB sheet
- 6 -- Reflexibility coating
- 7 -- Glass
- 8 -- Gas reservoir
- 9 -- Low radioactivity coating
- 10 -- Glass
- 11 -- Glass
- 12 -- PVB sheet
- 13 -- PVB sheet
- 14 -- PET sheet
- 15 -- PET sheet
- 16 -- Liquid crystal system
- 17 -- Reflexibility coating
- 18 -- Rigid base material

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[Translation done.]

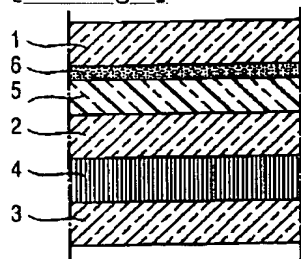
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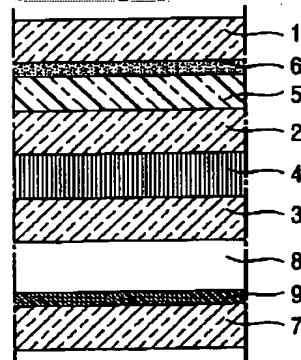
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**DRAWINGS**

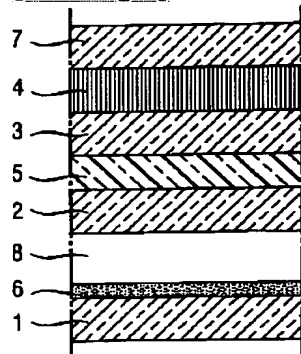
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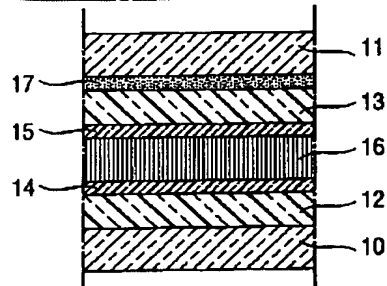
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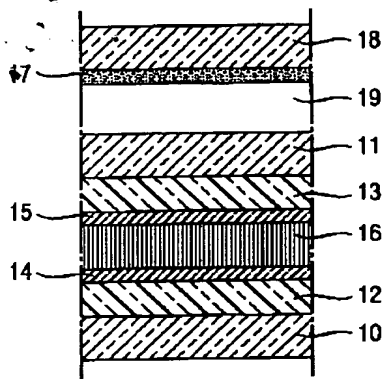
[Drawing 3]



[Drawing 4]



[Drawing 5]



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[Translation done.]